7.4.3 Provide direct services to local industry aimed at improving energy efficiency and clean energy (Energy efficiency assessment, workshops, research renewable energy options)

Yes

Yes, UBT provides direct services to local industry aimed at improving energy efficiency and promoting clean energy solutions. Through the College of Engineering and UBT Techno Valley, the university offers energy efficiency assessments, technical workshops, and applied research focused on renewable energy technologies.

UBT faculty actively collaborate with national and regional institutions on capacity-building initiatives in renewable energy. For instance, UBT's Electric Engineering Department participates in international programs such as the African Energy Commission (AFREC) Workshop on Renewable Energy Projects Planning, Development, and Financing (Algiers, 2025). Such participation enables UBT to transfer advanced knowledge and best practices to the local industrial sector, enhancing energy performance and supporting the Kingdom's Vision 2030 targets for sustainability and clean energy transition. Furthermore UBT scholars have also developed an innovative Nano Solar Invention, designed to increase solar energy efficiency through advanced nanotechnology, which demonstrates the university's commitment to research commercialization and sustainable energy innovation.

Noor Al-Alam: Powering Tomorrow from your Windows Today: Pioneering Nanotechnology for Global Solar Innovation from Saudi Arabia

by University of Business & Technology

Empowering a Sustainable Future: Unleashing the Potential of Nanotech for Solar Excellence from the Heart of Saudi Arabia

Flexible Substrate with Graphene Electrode

This research explores the development of third-generation solar cells, leveraging the unique properties of zinc oxide (ZnO) nanowires, nanowalls, quantum dots (QDs), and graphene. By integrating these advanced nanostructures, including Lead Sulfide (PbS) and perovskite QDs, with flexible substrates, the study has yielded highly efficient and adaptable sensitized solar cells. These cells, capable of being applied to both glass and flexible surfaces, demonstrate significant improvements in light absorption, charge carrier generation, and electron transfer. The research, conducted in collaboration with international institutions, including the University of Lille, aligns with Saudi Arabia's Vision 2030, aiming to revolutionize renewable energy generation and contribute to global sustainability. The findings highlight the potential for widespread application in urban environments, from building windows to automotive surfaces, positioning this technology at the forefront of the future energy landscape.

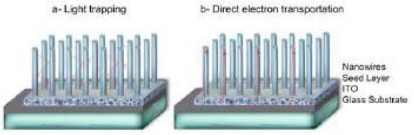
From Material to Device to Application: The Journey of Tomorrow's Solar Energy

The development of next-generation solar cells has taken a significant leap forward with the pioneering research on third-generation solar cells. This journey begins with the materials, moves through the device design, and culminates in a revolutionary application that has the potential to reshape how we think about energy in our daily lives.

The Materials: Building Blocks of Innovation

At the heart of this cutting-edge technology are materials that have been meticulously engineered for optimal performance. The primary component is Zinc Oxide (ZnO) Nanowires and Nanowalls—a patented material that forms the foundation of the solar cell.

Zinc Oxide (ZnO) is a highly versatile material that plays a critical role in the development of advanced solar cells. Known for its excellent electrical properties and ease of synthesis, ZnO is engineered into various nanostructures, such as nanowires and nanowalls, to maximize the surface area for light absorption. This enhancement in surface area significantly boosts the efficiency of solar cells by increasing the amount of light that can be captured and converted into electrical energy.



ZnO nanowires, in particular, offer unique advantages due to their elongated structure and high surface area. The one-dimensional geometry of nanowires leads to efficient light trapping, which enhances the interaction of light with the material, thus improving the overall performance of solar cells. Moreover, the structure of ZnO nanowires facilitates fast electron transfer, which is crucial for reducing recombination losses in solar cells. This means that the electrons generated by light absorption can quickly move through the material to generate an electric current, further increasing the efficiency of the device.

International and National Collaborators:

University of Ottawa, Ottawa, Canada
Université Gustave Eiffel, France
Northwest University, Xi'an, China
King Abdullah University of Science and Technology (KAUST), Saudi Arabia
King Abdul Aziz University, Saudi Arabia
IEMN UMR CNRS 8520, Université Polytechnique Hauts de France (UPHF), France
University of Electronic Science and Technology of China, Chengdu, Sichuan, China
IEMN UMR CNRS 8520, University of Lille Nord de France- France
Guangdong University of Technology, China
University of Cambridge, UK
University of Arizona, USA
University of Oulu, Finland

UBT
جامعة الأعمال و التكنولوجيا
UNIVERSITY OF BUSINESS AND TECHNOLOGY

AFRICAN ENERGY COMMISSION

اللجنة الإفريقية للطاقة

COMMISSION AFRICAINE DE L'ENERGIE

COMISSÃO AFRICANA D' ENERGIA

Réf.: **AFREC/L/PTN/242.25**
Date : **24 August 2025**

Dr. Samah Mohamed Hashim Siddig
Assistant Professor
Electric Engineering Department
University of business and technology
Email: samah_hashim@hotmail.com

Subject: **Invitation to Participate in the Validation Workshop of the Training Modules on Renewable Energy Projects Planning, Development, and Financing, 21 to 25 September 2025, Algiers - Algeria.**

Dear Dr. Siddig,

The African Energy Commission (AFREC) of the African Union is pleased to invite you to participate in the Validation Workshop of the Training Modules on Renewable Energy Projects Planning, Development, and Financing, to be held from 21 to 25 September 2025 at AFREC Headquarters in Algiers, Algeria.

As part of AFREC's Comprehensive Capacity Building Programme for the African Energy Sector, this workshop will bring together selected experts from regional institutions and academic centres to review, validate, and enrich the draft training modules developed under AFREC's consultancy with the Strathmore Energy Research Centre. These modules aim to strengthen institutional and human capacities in renewable energy project planning, development, and financing across the continent.

Your participation will provide valuable technical input to ensure the training content is relevant, context-specific, and aligned with the needs of AU Member States. By the conclusion of the workshop, participants will have agreed on the final structure and content of the modules, proposed recommendations for delivery across regions, and validated mechanisms for participant selection and post-training evaluation.

AFREC will cover your participation including a return economy-class airfare and daily subsistence allowance. The draft training modules will also be provided in advance.

We would be grateful to receive your confirmation of participation no later than 30th August 2025. For any further information, please contact Mr. Mehdi Khouili, Principal Policy Officer, Capacity Building and Country Support at khouilim@africanunion.org, or reach the AFREC Secretariat at afrec@africanunion.org.

We look forward to your valuable contribution to this important workshop.

Yours sincerely,

COMMISSION AFRICAINE DE L'ENERGIE AFREC

Mr. Rashid Ali Abdallah
Executive Director
African Energy Commission (AFREC)

Encl.: **Draft agenda and Concept note**